LEVELL

R.C. OSCILLATORS

TYPE TG 152 SERIES

INSTRUCTION MANUAL

OPERATING INSTRUCTIONS

for

R C OSCILLATORS
TYPE TG152 SERIES

GUARANTEE

We undertake to repair, or replace free of charge, any components that fail within 12 months of the date of purchase of an instrument provided that the instrument is not, in our opinion, modified or misused. Instruments returned by post should be well packed to avoid damage.

LEVELL ELECTRONICS LIMITED, MOXON STREET, BARNET, HERTS., ENGLAND.

Telephone: 01-449 5028
01-440 8686

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R.C. OSCILLATORS

TYPE TG152 SERIES

These low-priced, solid-state R.C. Oscillators generate sine and square waves at frequencies variable from 3Hz to 300kHz and amplitudes variable from 100μV to 2.5V r.m.s. Internal long-life batteries normally power these portable instruments but operation from an A.C. mains supply is possible when a Levell stabilised Power Unit is fitted in place of the batteries. The oscillators are constructed in robust steel cases that are fitted with insulating feet and insulated hinged legs that permit the cases to be tilted up by 20°.

The sinusoidal output is stabilised by a thermistor such that the amplitude is virtually constant throughout the frequency range and against supply voltage variations. Considerable negative feedback is applied to keep the harmonic content low and stable components are used to ensure that the frequency is negligibly affected by temperature variations.

A sync. output of constant amplitude is provided to trigger an oscilloscope or frequency counter.

VARIATIONS

Type TG152D: Sine and square wave outputs. No output meter.
Type TG152DM: Sine and square wave outputs. Output meter fitted.

FREQUENCY COVERAGE

3Hz to 300kHz in five ranges.

FREQUENCY ACCURACY

±2% ±0.1Hz up to 100kHz, increasing to ±3% at 300kHz.

FREQUENCY STABILITY

Change of frequency for ±15% shift on 16.5V supply is less than ±0.1% from 10Hz to 10kHz. Change of frequency with temperature is less than ±0.025% per °C from 30Hz to 30kHz and is less than ±0.04% per °C below 30Hz and above 30kHz.

OUTPUT AMPLITUDE

2.5V r.m.s. (7V p–p on sine) source voltage that can be reduced to less than 100μV by means of a continuously variable control and a switched attenuator that covers up to 60dB in 20dB steps. Available power output is 10mW into 600Ω.
Amplitude variation with frequency is less than ±1%. Amplitude variation on sine waves is −0.2% per °C and is less than ±0.1% for ±15% change on 16.5V supply. Amplitude variation on square waves is proportional to the supply.
Rise time on square waves is less than 100nS plus 0.5% of period.

OUTPUT ACCURACY

Versions with a meter are calibrated in r.m.s. source voltage from 0 to 2.5V with an accuracy ±4% f.s.d. Additional calibrated scale covers −10dB to +10dB.
Versions without a meter have the output control calibrated in r.m.s. voltage.
The additional attenuator error on 250mV, 25mV and 2.5mV is ±2%, ±3% and ±4%.

OUTPUT IMPEDANCE

600Ω ±2% via the attenuator. 250Ω maximum on sine waves above 250mV with fall to 3Ω at maximum output.

SINE WAVE DISTORTION

Harmonic content is less than 0.07% at 1kHz, less than 0.2% from 50Hz to 50kHz and less than 1% from 10Hz to 200kHz.

SYNC. OUTPUT

Sine wave in phase with the sine output, amplitude 2.5V r.m.s.

TEMPERATURE

The above characteristics are at 25°C but only minor divergencies exist from −10°C to +45°C.

POWER SUPPLY

Two Every Ready type PP9, or equivalent, batteries provide 16.5V ±15% supply. Current consumption is typically 13mA on sine waves and 17mA on square waves giving an average battery life of 400 hours on sine waves and 300 hours on square waves. Operation from an A.C. mains supply is possible when a LEVELL Power Unit is fitted in place of the batteries. The output from a Power Unit is stabilised against mains supply variations.

SIZE AND WEIGHT

7" x 10¼" x 5½" (18cm x 26cm x 14cm). 8lb. (3.6kg).

CARRYING CASES

Cases are available as optional extras. They are stiffened with board and felt lined. Shoulder straps are detachable and it is possible to use an instrument whilst in a case.

OPERATING INSTRUCTIONS FOR LEVELL R.C. OSCILLATORS TYPE TG152 SERIES.

1. Connection of Power Supply.

(a) Remove the four screws from the back panel.

(b) Place two batteries Ever Ready Type PP9, or equivalent, in the compartment provided and connect the snap fasteners. Alternatively, place a LEVELL Type PU16S in the compartment with the earth lead fixed under the screw securing the back panel.

(c) Replace the back panel and ensure that the screws are tight enough to make a good electrical connection between the panel and the case.

2. To Check Supply.

(a) Turn to —||— position on the AMPLITUDE switch.

(b) On Type TG152D observe the indicator lamp which should light when the batteries are in good condition.

(c) On Type TG152DM the meter is marked with limits for the battery voltage. Replace the batteries when the indication is below the lower limit after allowing 10 seconds for the meter to settle at a steady reading.

3. To Use the Oscillator.

(a) Turn the AMPLITUDE switch fully clockwise.

(b) Turn the FREQUENCY switch and variable control as desired.

(c) Turn the AMPLITUDE variable control as desired.

(d) The output voltage may be attenuated to 1/10th, 1/100th or 1/1000th of the chosen value by the use of the AMPLITUDE switch.

4. To Use the Voltmeter on Type TG152DM.

(a) Turn the Oscillator to an operating condition at a frequency above 30Hz.

(b) Turn the AMPLITUDE variable control fully anti-clockwise.

(c) Set the mechanical zero adjustment on the meter to give zero reading on the voltage scale.

(d) The meter will now read the voltage that exists across the output terminals when the AMPLITUDE switch is fully clockwise. On lower settings of this switch, the meter indicates the source voltage that feeds the output terminals via a source resistance of 600 ohms.

5. Adjustment of SET OUTPUT Control.

This control is located on the printed circuit board just below the thermistor. The adjustment is normally made at 25°C but may be made at an alternative temperature to suit the operating conditions of the oscillator.

The control on the TG152DM is set at a frequency of about 1kHz so that the meter reads 2.55V when the AMPLITUDE controls are fully clockwise.

The control on the TG152D is set with a standard voltmeter across the output terminals so that the output is 2.5V at the 2.5V marks on the AMPLITUDE controls.

6. Adjustment of Frequency Calibration.

The frequency calibration depends upon the setting of six preset controls on the printed circuit and upon the position at which the frequency control cursor is fixed on the variable frequency control. Adjustments should only be made in the following order with a frequency counter monitoring the output.

(a) Adjust the "SET OUTPUT" preset control as previously described.

(b) Check that the nut securing the variable frequency control is tight then fix the cursor and knob using only light pressure on one of the grub-screws. Select the position such that free travel of the control exists over the whole of the scale.

(c) Set the frequency controls to indicate 500Hz then measure the frequency F of the produced oscillation.

(d) Turn the control to indicate 2500Hz and observe the frequency produced. This is required to be 5F to within $\pm$0.2%. When the error is excessive, the knob should be refixed on the shaft so that the indicated frequency at 2500Hz on the dial is in error from 5F by the same magnitude as observed before but is now of opposite sign. (c) and (d) should then be repeated until the requirement is achieved.

(e) Adjust the X100 preset control so that the actual frequency produced is 500Hz at 500Hz on the scale. If it is found that 500Hz is not within the range of the control it will be necessary to add or disconnect a link on the rear wafer of the range switch, to add or subtract 1000pF shunt across the 10,000pF range capacitor.

(f) Measure the frequencies generated at all the captioned points on the scale. They should be correct to within $\pm$2%.
It may be necessary to reset the X100 control to satisfy this requirement. In extreme cases it may also be necessary to reset the knob on the shaft to optimise the performance over the whole scale. Clamp both

grub screws tightly when the performance is satisfactory and check that the control did not shift when the screws were tightened.

(g) Set the controls to indicate 40kHz and adjust the 40kHz trimmer capacitor until the frequency is correct.

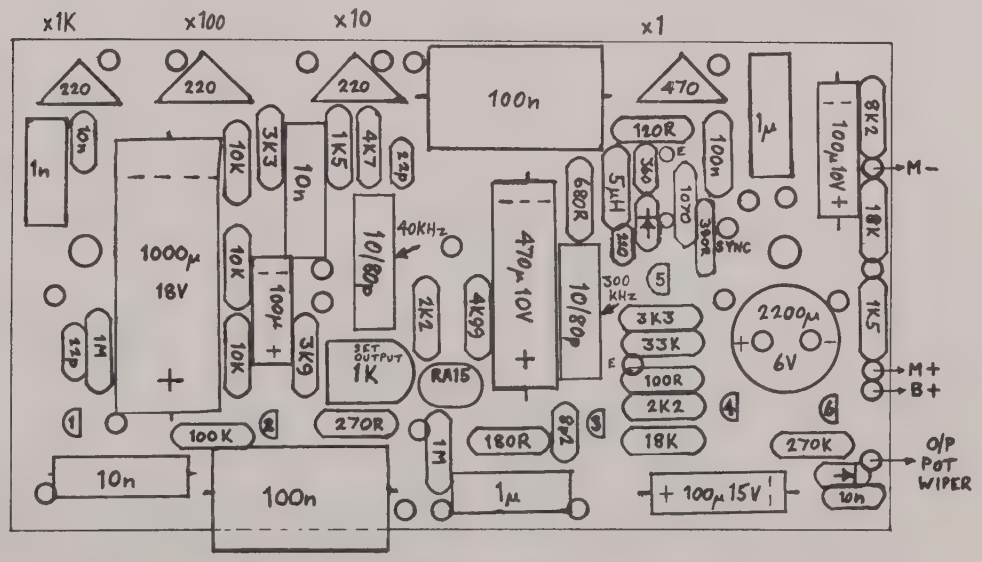
(h) Set the controls to indicate 300kHz and adjust the 300kHz trimmer capacitor until the frequency is correct when operating on a supply of 16.5V. As the frequency at 300kHz changes by about ±1.5% for a ±15% change of the supply, the adjustment of frequency at 300kHz should be made to take into account the actual supply voltage.

(i) Check the errors at all captioned points on the x10k range and if necessary reset the trimmers so errors are within ±2% up to 250kHz and ±1% at 300kHz on a 16.5V supply.

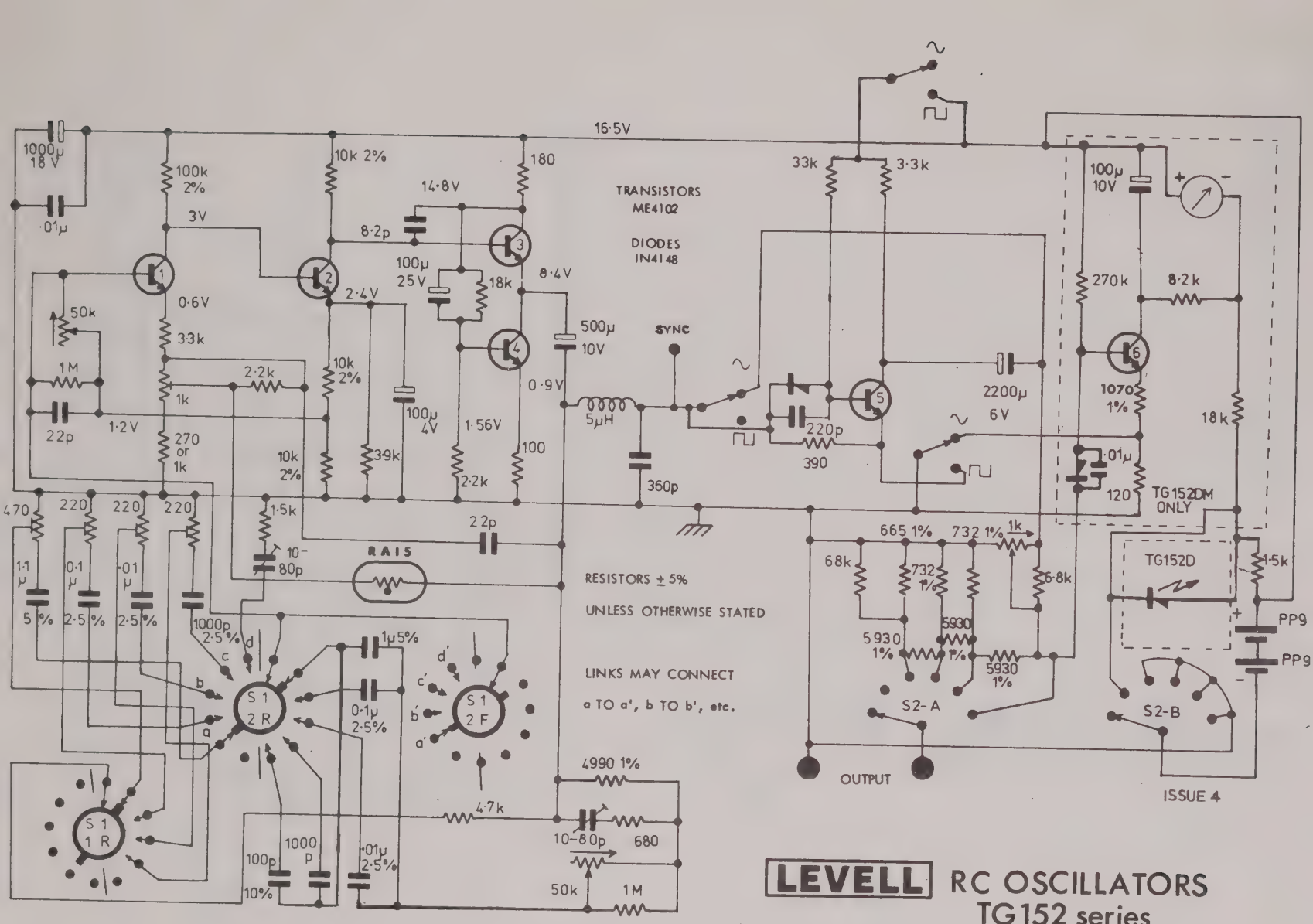
(j) Adjust the oscillator frequency to generate exactly 1kHz indicated on the counter. Turn to the x1k range and adjust the x1k preset control until the frequency is 10kHz. Add or remove link on the range switch as needed.

(k) Turn to x10 range and adjust the x10 control until the frequency is 100Hz. Add or remove link as needed.

(l) Turn to x1 range and adjust the x1 control until the frequency is 10Hz. Add or remove link as needed. Check captioned points on x1 range are all within ±2% ±0.1Hz.

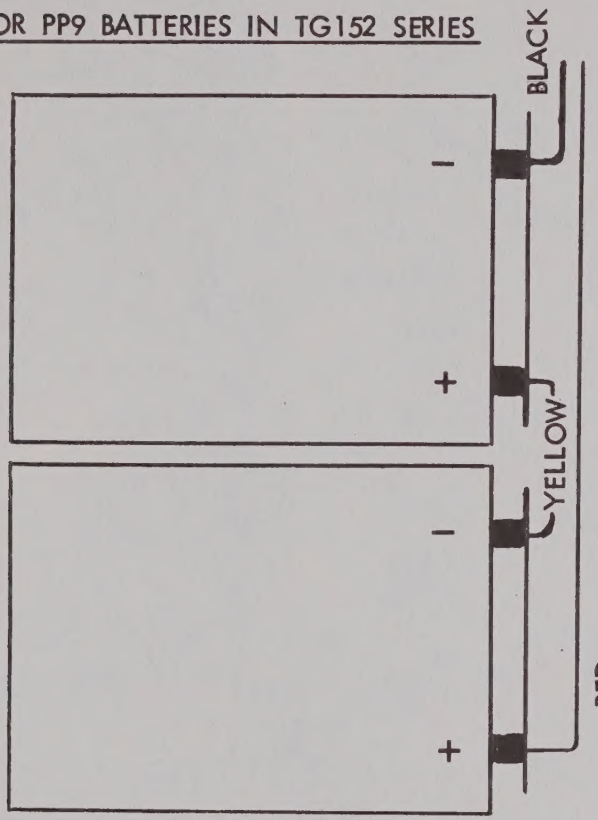


LEVELL TG152DM PCB LAYOUT FOR GF BOARD USED FROM 8/85.

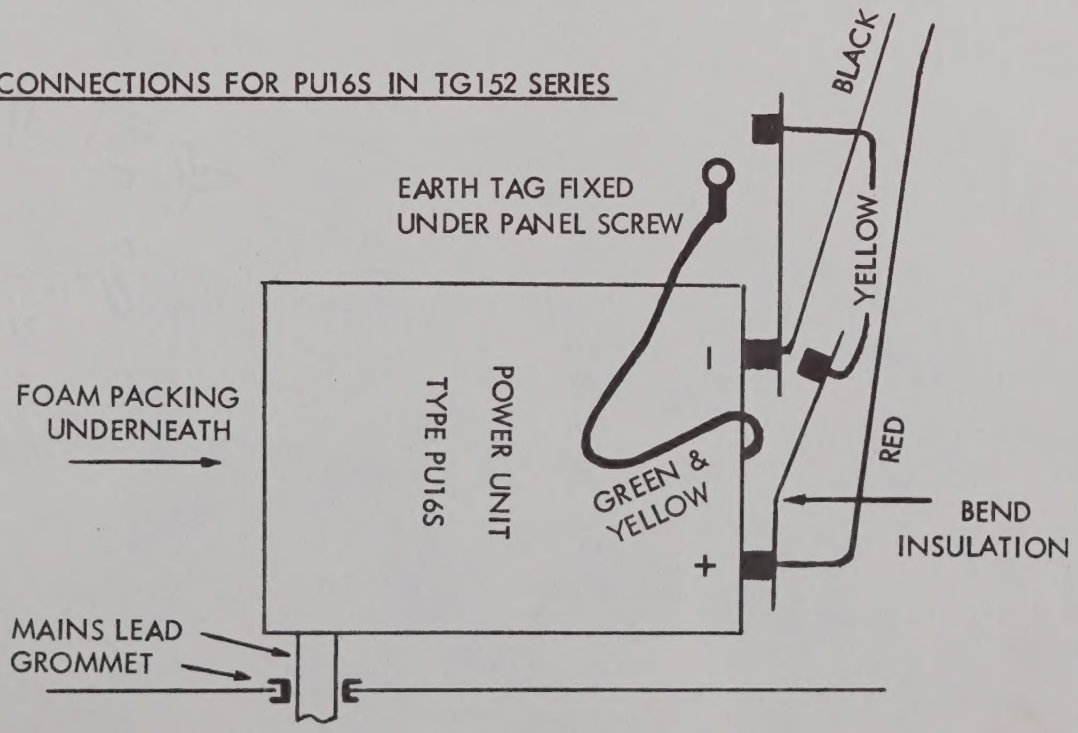


LEVELL RC OSCILLATORS
TG152 series

CONNECTIONS FOR PP9 BATTERIES IN TG152 SERIES



CONNECTIONS FOR PU16S IN TG152 SERIES



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